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EXAMINER

BELL, MELTIN

ART UNIT	PAPER NUMBER
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2121

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DATE MAILED: 12/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/767,279

Applicant(s)

RISING, HAWLEY K.

Examiner

Meltin Bell

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-5 and 7-14 is/are pending in the application.
- 4a) Of the above claim(s) 1 and 6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-5 and 7-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4-6, 8. 6) ☐ Other: _____

DETAILED ACTION

This action is responsive to application **09/767,279** filed **January 22, 2001** and later amended November 21, 2003.

Claims 1 and 6 have been cancelled by the applicant and are therefore withdrawn from consideration. Claims 2 (Currently Amended) through 5 (Currently Amended) and 7 (Currently Amended) through 14 (New) have been examined.

Information Disclosure Statement

Applicant is respectfully reminded of the ongoing Duty to disclose 37 C.F.R. 1.56 all pertinent information and material pertaining to the patentability of applicant's claimed invention, by submitting in a timely manner PTO-1449, Information Disclosure Statement (IDS) with the filing of applicant's application or thereafter.

The information disclosure statement filed November 28, 2003 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because of missing or inaccurate information in the listing:

- An article by Abbie L. Warrick and Pamela A. Delaney ("Detection of Linear Features Using a Localized Radon Transform with a Wavelet Filter"; IEEE International Conference on Acoustics, Speech and Signal Processing; Apr 1997; Vol. 4; pp 2769-2772) was found unlisted.
- The title of each of the three Sahiner et al references should start with Iterative vs. Interactive.

- “Using Image-Adaptive Wavelet Constraints” is not part of the Olson reference title.
- U.S. Patent Number 6,560,586 was missing sheet 6 of 6 and the page with columns 1 and 2.

It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 ¶ C(1).

Drawings

The drawings have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is required in correcting any errors of which applicant may become aware in the drawings.

The United States Patent and Trademark Office of Draftperson's Patent Drawings Review have reviewed the formal drawings. They are objected to by the Draftsperson under 37 CFR 1.84 or 1.152 for the reasons indicated on Form PTO-948, Notice of Draftsperson's Patent Drawing Review. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is required in correcting any errors of which applicant may become aware in the specification.

The disclosure is objected to because of the following informalities:

- The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: Methods, Systems, Apparata and Models for Neural Network Training Using a Neural Network

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The invention as disclosed in claims 2 and 4 are directed to non-statutory subject matter. Claims 2 and 4 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a credible asserted utility or a well established utility.

As a system, claim 4 is not in the technological arts because it can be realized on paper with pen or pencil, in a printed manual, within one's head, etc.

As a method, claim 2 offers abstract ideas (e.g. "model", "function") that are also not applied in the technological arts. Abstract ideas and their manipulation constitute "descriptive material" that is not patentable, *Warmerdam*, 33 F.3d at 1360, 31 USPQ2d at 1759 and *Schrader*, 22 F.3d at 292-93, 30 USPQ2d at 1457-58, respectively. If the abstract ideas of claim 2 represented functional descriptive material consisting of data structures and computer programs which impart functionality when employed as a computer component (recorded on some computer readable medium), they become structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. For examples,

- *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) offers claim to data structure stored on a computer readable medium that increases computer efficiency held statutory and
- *Warmerdam*, 33 F.3d at 1360-61, 31 USPQ2d at 1759 offers product-by-process claim to computer having a specific data structure stored in memory also held statutory while
- *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 offers claim to a data structure *per se* held nonstatutory.

Because the claims are not claimed to be practiced on a computer and/or stored on a computer readable medium, they are not limited to practical applications in the technological arts. Specifically, the claims are systems and methods without any particular practical application, such as a program running on a computer and stored in

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a computer readable medium or memory. On that basis alone, those claims are clearly nonstatutory.

Claims 2 and 4 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a credible asserted utility or a well established utility. Claims 2 and 4 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a credible asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC § 112

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 2 and 4 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

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Support for this 35 U.S.C. 112, first paragraph rejection comes from MPEP

2164.07(I)(A):

"As noted in *In re Fouché*, 439 F.2d 1237, 169 USPQ 429 (CCPA 1971), if "compositions are in fact useless, appellant's specification cannot have taught how to use them." 439 F.2d at 1243, 169 USPQ at 434. The examiner should make both rejections (i.e., a rejection under 35 U.S.C. 112, first paragraph and a rejection under 35 U.S.C. 101) where the subject matter of a claim has been shown to be nonuseful or inoperative. The 35 U.S.C. 112, first paragraph, rejection should indicate that because the invention as claimed does not have utility, a person skilled in the art would not be able to use the invention as claimed, and as such, the claim is defective under 35 U.S.C. 112, first paragraph."

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: The connection of the Radon transform generator to the feeder vs. the decision module.

Unlike Figure 14, the claim suggests the Radon transform generator and feeder are connected to the decision module: a Radon transform generator to generate a Radon transform to fit the simple finite geometry model, the Radon transform generator coupled to the decision module, wherein the Radon transform generator comprises the second neural network; a feeder to feed the desired function through the Radon transform to generate weights, the feeder coupled to the decision module. Figure 14 suggests only the feeder is connected to the decision module. Figure 14 also clearly indicates the connection of the feeder to the Radon transform generator (e.g. "through" in the claim).

Claim Rejections - 35 USC § 103

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2-5 and 7-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Elsherif et al* (1994) in view of

- *Boone et al* U.S. Patent Numbers 5,953,452 (September 14, 1999)
- *Samarasekera et al* U.S. Patent Number 5,960,055 (September 28, 1999)

and further in view of *Rising* (2000)

Regarding claim 2 (Currently Amended):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first... the basic network")

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- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function;
- determining if the created model fits a simple finite geometry model;
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network;
- feeding the desired function through the Radon transform to generate weights while *Boone et al* teaches,
- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
- determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency.

Then...using simple geometry")

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer perceptron of the first neural network using the weights) would have been highly desirable features in this art for

- ☐ increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not...Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as...of the invention")
- ☐ improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of...net classification rates")
- ☐ better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights...improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al* and *Samarasekera et al* to obtain the invention specified in claim 2, training a first neural network using a second

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neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize neural network applications without compromising performance or accuracy.

Regarding claim 3 (Currently amended):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first...the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function
- determining if the created model fits a simple finite geometry model
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network
- feeding the desired function through the Radon transform to generate weights
- the first neural network and the second neural network are dual to each other

while *Boone et al* teaches,

- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")

- determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency.

Then...using simple geometry")

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")

- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")

- feeding the desired function through the Radon transform to generate weights FIG. 1; (column 3, lines 50-62, "weight factors which...the Radon transform")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer

perceptron of the first neural network using the weights; the first neural network and the second neural network are dual to each other) would have been highly desirable features in this art for

- computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, “we need to...independent of dimension”)
- increasing precision (*Samarasekera et al*, column 3, lines 63-67, “The invention not...Furthermore, simple multiprocessor”; column 4, lines 1-2, “hardware, such as...of the invention”)
- improving rates of classification (*Boone et al*, column 5, lines 2-6, “Primitive features of...net classification rates”)
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, “Making the weights...improving the generalization”)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 3, training a first neural network using a second neural network which are dual to each other. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

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Regarding claim 4 (Currently amended):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first...the basic network")
- means for training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")

However, *Elsherif et al* doesn't explicitly teach

- means for creating a model for a desired function as a multi-dimensional function
- means for determining if the created model fits a simple finite geometry model
- means for generating a Radon transform to fit the simple finite geometry model, the means for generating comprising the second neural network
- means for feeding the desired function through the Radon transform, to generate weights

while *Boone et al* teaches,

- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- means for creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
- means for determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")

- means for generating a Radon transform to fit the simple finite geometry model, the means for generating comprising the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")

- means for feeding the desired function through the Radon transform, to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")

- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Motivation - The portions of the claimed method (means for creating a model for a desired function as a multi-dimensional function; means for determining if the created model fits a simple finite geometry model; means for generating a Radon transform to fit the simple finite geometry model, the means for generating comprising the second neural network; means for feeding the desired function through the Radon transform, to generate weights; means for training a multilayer perceptron of the first neural network using the weights) would have been highly desirable features in this art for

- increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not...Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as...of the invention")

- improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of...net classification rates")
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights...improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al* and *Samarasekera et al* to obtain the invention specified in claim 4, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize neural network applications without compromising performance or accuracy.

Regarding claim 5 (Currently amended):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first...the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function;
- determining if the created model fits a simple finite geometry model;
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network;
- feeding the desired function through the Radon transform to generate weights

while *Boone et al* teaches,

- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
- determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency.

Then...using simple geometry")

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model,

the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer perceptron of the first neural network using the weights) would have been highly desirable features in this art for

- increasing precision (*Samarasekera et al*, column 3, lines 63-67, “The invention not... Furthermore, simple multiprocessor”; column 4, lines 1-2, “hardware, such as... of the invention”)
- improving rates of classification (*Boone et al*, column 5, lines 2-6, “Primitive features of... net classification rates”)
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, “Making the weights... improving the generalization”)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al* and *Samarasekera et al* to obtain the invention specified in claim 5, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize neural network applications without compromising performance or accuracy.

Regarding claim 7 (Currently amended):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, “Simultaneously, the first... the basic network”)

- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")

However, *Elsherif et al* doesn't explicitly teach

- a model generator to create a model for a desired function as a multi-dimensional function

- a decision module to determine if the created model fits a simple finite geometry model, the decision module coupled to the model generator

- a Radon transform generator to generate a Radon transform to fit the simple finite geometry model, the Radon transform generator coupled to the decision module, wherein the Radon transform generator comprises the second neural network

- a feeder to feed the desired function through the Radon transform to generate weights, the feeder coupled to the decision module

- a training module to train a multilayer perceptron of the first neural network using the weights, the training module coupled to the Radon transform generator

while *Boone et al* teaches,

- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")

- a model generator to create a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")

- a decision module to determine if the created model fits a simple finite geometry model, the decision module coupled to the model generator (FIG. 1; column 3, lines 63-

67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")

- a Radon transform generator to generate a Radon transform to fit the simple finite geometry model, the Radon transform generator coupled to the decision module, wherein the Radon transform generator comprises the second neural network (FIG. 1; column 1, lines 55-60, "The optical-digital processor...in video imagery")
- a feeder to feed the desired function through the Radon transform to generate weights, the feeder coupled to the decision module (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")
- a training module to train a multilayer perceptron of the first neural network using the weights, the training module coupled to the Radon transform generator (FIG. 1; column 1, lines 21-24, "pattern recognition solutions...precluded extensive development"; column 5, lines 55-67, "The combined annular...object (or its"; column 5, lines 1-2, "Fourier components), classification...identify the object")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Motivation - The portions of the claimed method (a model generator to create a model for a desired function as a multi-dimensional function, a decision module to determine if

the created model fits a simple finite geometry model, the decision module coupled to the model generator; a Radon transform generator to generate a Radon transform to fit the simple finite geometry model, the Radon transform generator coupled to the decision module, wherein the Radon transform generator comprises the second neural network; a feeder to feed the desired function through the Radon transform to generate weights, the feeder coupled to the decision module; a training module to train a multilayer perceptron of the first neural network using the weights, the training module coupled to the Radon transform generator) would have been highly desirable features in this art for

- increasing precision (*Samarasekera et al*, column 3, lines 63-67, “The invention not... Furthermore, simple multiprocessor”; column 4, lines 1-2, “hardware, such as...of the invention”)
- improving rates of classification (*Boone et al*, column 5, lines 2-6, “Primitive features of...net classification rates”)
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, “Making the weights...improving the generalization”)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al* and *Samarasekera et al* to obtain the invention specified in claim 7, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize neural network applications without compromising performance or accuracy.

Regarding claim 8 (Original):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first...the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")

However, *Elsherif et al* doesn't explicitly teach

- a model generator to create a model for a desired function as a multi-dimensional function
 - a decision module to determine if the created model fits a simple finite geometry model, the decision module coupled to the model generator
 - a Radon transform generator to generate a Radon transform to fit the simple finite geometry model, the Radon transform generator coupled to the decision module, wherein the Radon transform generator comprises the second neural network
 - a feeder to feed the desired function through the Radon transform to generate weights, the feeder coupled to the decision module
 - a training module to train a multilayer perceptron of the first neural network using the weights, the training module coupled to the Radon transform generator
 - the first neural network and the second neural network are dual to each other
- while *Boone et al* teaches,
- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")

- a model generator to create a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
 - a decision module to determine if the created model fits a simple finite geometry model, the decision module coupled to the model generator (FIG. 1; column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
 - a Radon transform generator to generate a Radon transform to fit the simple finite geometry model, the Radon transform generator coupled to the decision module, wherein the Radon transform generator comprises the second neural network (FIG. 1; column 1, lines 55-60, "The optical-digital processor...in video imagery")
 - a feeder to feed the desired function through the Radon transform to generate weights, the feeder coupled to the decision module (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")
 - a training module to train a multilayer perceptron of the first neural network using the weights, the training module coupled to the Radon transform generator (FIG. 1; column 1, lines 21-24, "pattern recognition solutions...precluded extensive development"; column 5, lines 55-67, "The combined annular...object (or its"; column 5, lines 1-2, "Fourier components), classification...identify the object")
- Samarasekera et al* teaches,
- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")

- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")

Motivation - The portions of the claimed method (a model generator to create a model for a desired function as a multi-dimensional function, a decision module to determine if the created model fits a simple finite geometry model, the decision module coupled to the model generator; a Radon transform generator to generate a Radon transform to fit the simple finite geometry model, the Radon transform generator coupled to the decision module, wherein the Radon transform generator comprises the second neural network; a feeder to feed the desired function through the Radon transform to generate weights, the feeder coupled to the decision module; a training module to train a multilayer perceptron of the first neural network using the weights, the training module coupled to the Radon transform generator; the first neural network and the second neural network are dual to each other) would have been highly desirable features in this art for

- ☐ computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, "we need to...independent of dimension")
- ☐ increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not... Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as...of the invention")

- improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of...net classification rates")
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights...improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 8, training a first neural network using a second neural network which are dual to each other. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

Regarding claim 9 (New):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first...the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function;
- determining if the created model fits a simple finite geometry model;
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network;

- feeding the desired function through the Radon transform to generate weights
- applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two

while *Boone et al* teaches,

- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
- determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency.

Then...using simple geometry")

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")
- applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer perceptron of the first neural network using the weights; applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two) would have been highly desirable features in this art for

- computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, "we need to...independent of dimension")
- increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not...Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as...of the invention")
- improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of...net classification rates")

- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights...improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 9, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

Regarding claim 10 (New):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first...the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")
- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer (Figure-2)

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function;
- determining if the created model fits a simple finite geometry model;
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network;
- feeding the desired function through the Radon transform to generate weights

while *Boone et al* teaches,

- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
- determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency.

Then...using simple geometry")

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")

- applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")
- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer (Figure 1)

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer perceptron of the first neural network using the weights; the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer) would have been highly desirable features in this art for

- ☐ computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, "we need to...independent of dimension")
- ☐ increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not... Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as...of the invention")
- ☐ improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of...net classification rates")
- ☐ better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights...improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 10, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

Regarding claim 11 (New):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first...the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward...is trained")
- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer (Figure-2)

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function;
- determining if the created model fits a simple finite geometry model;
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network;
- feeding the desired function through the Radon transform to generate weights
- calculating additional weights using the Radon transform
- interpolating additional nodes in the hidden layer based on the additional weights

while *Boone et al* teaches,

- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
- determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency.

Then...using simple geometry")

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")

Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")
- interpolating additional nodes in the hidden layer based on the additional weights (column 6, lines 33-38, "the weight factors...derivative calculation, etc.")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")
- applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")
- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer (Figure 1)
- calculating additional weights using the Radon transform (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer perceptron of the first neural network using the weights; the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer; calculating additional weights using the Radon transform; interpolating additional nodes in the hidden layer based on the additional weights) would have been highly desirable features in this art for

- computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, "we need to...independent of dimension")

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- increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not... Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as... of the invention")
- improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of... net classification rates")
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights... improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 11, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

Regarding claim 12 (New):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first... the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward... is trained")

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function
- determining if the created model fits a simple finite geometry model

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network
 - feeding the desired function through the Radon transform to generate weights
 - applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two
- while *Boone et al* teaches,
- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
 - creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
 - determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- Then...using simple geometry")
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
 - feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")
- Samarasekera et al* teaches,
- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")

- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")
- applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")
- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer (Figure 1)
- calculating additional weights using the Radon transform (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer perceptron of the first neural network using the weights; applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two) would have been highly desirable features in this art for

- computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, "we need to...independent of dimension")

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- increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not... Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as... of the invention")
- improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of... net classification rates")
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights... improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 12, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

Regarding claim 13 (New):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first... the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward... is trained")

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function
- determining if the created model fits a simple finite geometry model

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- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network
 - feeding the desired function through the Radon transform to generate weights
 - the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer
- while *Boone et al* teaches,
- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
 - creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
 - determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- Then...using simple geometry")
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
 - feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")
- Samarasekera et al* teaches,
- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")

- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")

- applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")

- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer (Figure 1)

- calculating additional weights using the Radon transform (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer perceptron of the first neural network using the weights; the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer) would have been highly desirable features in this art for

- computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, "we need to...independent of dimension")

- increasing precision (*Samarasekera et al*, column 3, lines 63-67, "The invention not... Furthermore, simple multiprocessor"; column 4, lines 1-2, "hardware, such as... of the invention")
- improving rates of classification (*Boone et al*, column 5, lines 2-6, "Primitive features of... net classification rates")
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, "Making the weights... improving the generalization")

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 13, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

Regarding claim 14 (New):

Elsherif et al teaches,

- two neural networks for adjusting the weights of a third neural network (Abstract, sentences 4-5, "Simultaneously, the first... the basic network")
- training a multilayer perceptron of the first neural network using the weights (Abstract, sentence 3, "The feed-forward... is trained")

However, *Elsherif et al* doesn't explicitly teach

- creating a model for a desired function as a multi-dimensional function
- determining if the created model fits a simple finite geometry model

- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network
- feeding the desired function through the Radon transform to generate weights
- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer
- calculating additional weights using the Radon transform
- interpolating additional nodes in the hidden layer based on the additional weights while *Boone et al* teaches,
- training in pattern recognition applications (column 1, lines 21-24, "pattern recognition solutions...precluded extensive development")
- creating a model for a desired function as a multi-dimensional function (column 2, lines 35-37, "FIG. 3, consisting of...and multiple boundaries")
- determining if the created model fits a simple finite geometry model (column 3, lines 63-67, "in practice a...to obtain the"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network (column 1, lines 55-60, "The optical-digital processor...in video imagery")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 4, lines 27-41, "The Hough...represent Hough space")
Samarasekera et al teaches,

- determining if the created model fits a simple finite geometry model (column 5, lines 49-67, "the calculations needed...by corresponding weights"; column 4, lines 1-2, "cutoff frequency. Then...using simple geometry")
- feeding the desired function through the Radon transform to generate weights (FIG. 1; column 3, lines 50-62, "weight factors which...the Radon transform")
- interpolating additional nodes in the hidden layer based on the additional weights (column 6, lines 33-38, "the weight factors...derivative calculation, etc.")

Rising teaches,

- the first neural network and the second neural network are dual to each other (page 400, Abstract, sentence 5, "We create a...non-image processing applications")
- applying the Radon transform to the model in multiple stages if the created model has a geometry greater than two (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")
- the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer (Figure 1)
- calculating additional weights using the Radon transform (page 408, section 7, paragraph 1, "The theorem connecting...at least Turing")

Motivation - The portions of the claimed method (creating a model for a desired function as a multi-dimensional function; determining if the created model fits a simple finite geometry model; generating a Radon transform to fit the simple finite geometry model, the Radon transform generated by the second neural network; feeding the desired function through the Radon transform to generate weights; training a multilayer

perceptron of the first neural network using the weights; the multilayer perceptron comprises a hidden layer of nodes and connections, and the weights are set on the connections at the hidden layer; calculating additional weights using the Radon transform; interpolating additional nodes in the hidden layer based on the additional weights) would have been highly desirable features in this art for

- computing on arbitrarily large dimensions (*Rising* 2000, page 408, section 7, paragraph 1, sentence 5-12, “we need to...independent of dimension”)
- increasing precision (*Samarasekera et al*, column 3, lines 63-67, “The invention not... Furthermore, simple multiprocessor”; column 4, lines 1-2, “hardware, such as...of the invention”)
- improving rates of classification (*Boone et al*, column 5, lines 2-6, “Primitive features of...net classification rates”)
- better generalization (*Elsherif et al*, page 536, paragraph 3, sentence 2, “Making the weights...improving the generalization”)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine *Elsherif et al* with *Boone et al*, *Samarasekera et al* and *Rising* to obtain the invention specified in claim 14, training a first neural network using a second neural network. The modification would have been obvious because one of ordinary skill in the art would have been motivated to generalize and scale the size of neural network applications without compromising performance or accuracy.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A. *Samarasekera et al* U.S. Patent Number 5,960,055 (September 28, 1999)

B. *Boone et al* U.S. Patent Numbers 5,953,452; 5,101,270

C. *Aghajan et al* U.S. Patent Number 5,311,600

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meltin Bell whose telephone number is 703-305-0362. The examiner can normally be reached on Mon - Fri 7:30 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anil Khatri can be reached on 703-305-0282. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-5514 for regular communications and 703-305-3988 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

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December 18, 2003


ANIL KHATRI
SUPERVISORY PATENT EXAMINER